PROCEEDINGS

OF THE

ROYAL SOCIETY OF EDINBURGH.

1844. No. 24.

Elections omitted in No. 23.

18*th February* 1843.

Arthur Forbes, Esq. of Culloden.
J. Burn Murdoch, Esq.

Monday, 2*d January* 1844.

The Hon. Lord Murray.

Monday, 5*th February* 1844.

Sir T. M. BRISBANE, Bart., President, in the Chair.

The following communications were read :—

1. On the Tides of the Firth of Forth, and the East Coast of Scotland. By J. S. Russell, Esq. (Abstract of this paper not obtained from the author.)

2. Additional Observations as to the Poisonous Properties of Œnanthe crocata. By Dr Christison.

In this paper the Author added a few supplementary observations to those made on the alleged poisonous properties of the *Œnanthe crocata*, in his paper on the poisonous *Umbelliferæ*, read on the 4th December last.

He stated that he had met with other cases of poisoning with this plant, recorded by Continental authors, shewing that death may take place in an hour,—that so small a quantity as a single tuber, no bigger than the finger, has proved fatal,—that the roots are poisonous in some countries, from the beginning of January till the middle of October at all events, and probably throughout the whole year; and that Spain may be added to the countries formerly mentioned, where fatal effects have been produced by the plant.

He next added, that he had recently tried on a dog the effects of the juice of a pound of tubers, collected by Dr Pereira on the 16th December from the locality at Woolwich; and that no effect, or an exceeding slight one only, was produced.

It was farther observed, that, according to an analysis executed in 1830 by MM. Pihan-Dufeilay and Cormerais, the activity of the roots in French plants depends upon a resin. On proceeding to try upon a rabbit the effects of the resin, obtained by their process from the Woolwich plants, the author found that, when the resin from eight ounces avoirdupois, amounting to 24 grains, was introduced in the state of emulsion into the cellular tissue, the animal died in 78 minutes, after being affected with a remarkable combination of tetanic spasm and convulsions: but that no effect whatever was produced by the resinous extract from the same quantity of roots obtained about the same season of the year (midwinter) from the Dalmeny œnanthe, near Edinburgh,

He concluded this notice with an account of some experiments on the chemical analysis of œnanthe, observing that he had failed to obtain any principle from the Dalmeny seeds or root, by a process analogous to that by which conia is obtained from hemlock; and that the alcoholic extract of the Woolwich plants, distilled with solution of potash, yielded, like hemlock, a little oleaginous-like fluid, which was too minute in quantity for him to ascertain its properties accurately, but which on the whole seemed a volatile oil, and not an alkaloid.

Lieut.-Colonel Lowe was duly elected an Ordinary Fellow.

Monday, 19*th February* 1844.

Dr ABERCROMBIE, V. P., in the Chair.

The following communications were read:—

1. On the Cellular Fibre and the Incrusting Matters of Plants. By Mr P. F. H. Fromberg. Communicated by Professor Johnston.

The results obtained by the author, on analysing the cellular fibre of different kinds of plants, after a sufficient purification, are, on the whole, in conformity with those of Payen. But he considers the formula, which Payen has derived from his results, an inconvenient one ; and that the composition of cellular fibre is in conformity with that of inuline, rather than with that of starch, as that chemist has supposed.

The author observes that he obtained, by treating different kinds of wood in different ways, a great many substances, of different properties and composition. As to the composition, however, it could almost always be represented by a formula, differing, more or less, from that of ulmic acid, only by the number of equivalents of hydrogen, that of the carbon and oxygen remaining the same. The composition of the ulmic acid is, according to numerous and accurate experiments of Professor Mulder, $C^{40} H^{14} 0^{12} +$, a greater or less number of equivalents of water, according to the temperature at which the substances are dried, and the manner in which they are obtained.

Now, according to the analysis of several kinds of wood, and especially of the more constant, hard perisperm of the stone fruits analysed by M. von Baumhauer, the following formula is determined :—

	Found.	Atoms.	Calculated.
Carbon,	52.5	64	52.38
Hydrogen,	5.9	44	5.88
Oxygen,	41.6	39	41.74
	100		100

If we subtract from this formula . . $C^{64} H^{44} 0^{39}$

That of the cellular fibre, . . . $C^{24} H^{21} 0^{21}$

There remains, ... $C^{40} H^{23} 0^{18}$

As the average formula of all kinds of incrusting matters, which may be easily reduced to this :—

$$C^{40} H^{17} 0^{12} + 6 H 0,$$

A combination which differs from ulmic acid only by three equivalents of hydrogen.

All the matters obtained and analysed by the author, could be represented by formulæ from $C^{40} H^{22} 0^{12}$ to $C^{40} H^{14} 0^{12}$, all the others containing 20, 21, 19, *etc.* of hydrogen. The last formula, $C^{40} H^{14} 0^{12}$ + water, which is at the same time that of ulmic acid, represented a substance obtained after the action of strong reagents.

In all these experiments, an augmentation of carbon was accompanied by a diminution of hydrogen; but the proportion of the change varied.

According to the author's experiments, so far as they have gone, cellular fibre is not only soluble in alkalies, but also gradually changed by them into matters which approach, more and more, to the composition and properties of the ulmic acid. The difference between the action of alkalies and of acids consists in this: that the states of transition, namely dextrine and sugar, are not produced by the action of the alkalies. Cellular fibre and the incrusting matters, when united in the substance of the plant, resist more powerfully the influence of chemical reagents, than when they are separated from each other. Payen's idea, that the incrusting matters should be considered as consisting of three substances, two of which are electro-negative, seems much too limited and artificial.

The quantity of nitrogen found in these substances was much too small to exercise any influence on the composition. It is the younger parts of growing plants to which nitrogen is indispensable, and in which it can always be found and demonstrated.

Finally, it is not improbable that there exists a whole series of incrusting matters, always present in their substance, for the use of the different fluids and organs of plants: a purpose for which they are eminently calculated, by their great facility of transformation, and by their strong tendency to attract water.

Were we to assume the transitory existence of ulmic acid in the cells, we should probably obtain wider ideas with regard to the growth and decay of plants. It is well known, with respect to the decay of vegetable matter, that a large quantity of hydrogen must be set free during its decomposition, by means of which the formation of ammonia in the soil is eminently favoured.

In the converse process, that of growth, precisely the opposite process—that is, combination with hydrogen—must occur. Growth is thus a reduction, decay an oxidation. The ulmic acid would thus be, after the formation of the primary cell fibres, the common source of all the matters deposited in the cells, in all plants which are rooted in the ground.

If we agree to this proposition, then we do not require the decomposition of water to explain the growth of plants. The large quantity of pectine, $C^{12} H^{8} O^{10}$, which is present in some parts of so many plants, and which may be considered as the incrusting matter of the cells of carrots, turnips, different kinds of fruits, &c.

together with other organic matters which contain much oxygen—for instance, oxalic acid—may be the cause of the relative and various abundance of hydrogen in the products of ulmic acid—namely, the incrusting matters of plants.

2. On a remarkable Oscillation of the Sea observed at various places on the coasts of Great Britain, in the first week of July 1843. By David Milne, Esq.

This phenomenon was observed on the 5th July and three following days. It did not occur on all parts of the coasts of Great Britain. In England, it was observed only on the south shores of Cornwall and Devonshire. In Scotland, it was observed on the east coast; and there it was seen at a great many places, between Eyemouth in Berwickshire and the Shetland Islands.

It was only on the 5th July that the oscillation occurred on the Cornish and Devonshire coasts. It prevailed on the Scottish coast, however, from the 5th to the 7th July inclusive.

The phenomenon consisted of a flux and reflux of the sea, beyond what could be accounted for by ordinary tides, or any wind prevailing at the time. The water suddenly rose up and sunk down from 2 to 5 feet in perpendicular height, producing effects more or less striking, according to the shelving character of the shore.

In regard to the cause of the phenomenon, various had been the surmises; though the general impression seemed to be, that it was produced by distant submarine earthquakes.

The author stated that he could not acquiesce in this view, and gave his reasons for saying so.

In order to obtain a wider field of induction, he referred to former instances of oceanic oscillations, and shewed that they were almost always accompanied with considerable atmospheric disturbances.

He then proceeded to give an account of a remarkable storm of wind, accompanied by thunder, lightning, and hail, which had traversed the British Islands on the 5th July, appearing first in the SW. of England, and passing through the midland counties, traversing the south-east parts of Scotland, and going off about the Aberdeenshire coast.

By the lightning and large hail-stones accompanying this storm, much damage to property, as well as loss of life, had occurred. At Sheffield, the barometer was, during the passage of the storm, observed to sink suddenly about an inch.

The storm appeared to have rotated, and in the usual way,—viz. in a direction contrary to that of the hands of a watch,—of which proofs were given.

The author then suggested, that the oscillations in question were probably produced by this storm. The parts of the coast where they were observed, coincided with the direction in which the storm moved. The fact that the oscillations on the Cornish and Devonshire coasts commenced before the storm arrived there, so far from being hostile to, supported this view; for if waves were created by the storm, as it approached Great Britain, these waves would advance more rapidly than the storm, which appeared to move northwards at the rate of from 70 to 80 miles per hour,—whereas the similar waves produced by the two Lisbon earthquakes had moved forward at a rate of from 120 to 130 miles per hour.

As to the way in which waves could be produced on the surface of the ocean, sufficient to produce the fluxes and refluxes in question, it was observed—

(1.) That the wind, by its mere mechanical pressure, was capable of heaping up, over a large expanse, a considerable body of water. By the force of the south or south-west blasts in the storm, the sea would be elevated, and waves would thereby be formed, which would move forward before the storm towards the south coast of England.

(2.) That the level of the ocean rises in proportion to the fall of the barometer; so that if, as there was every reason to suppose, this storm was accompanied in its track by a diminution of atmospherical weight, waves almost commensurate in extent with the diameter of the storm would be formed.

In either or in both of these ways, the sea may have been, and probably was, so affected on the 5th, 6th, and 7th July 1843, as to produce the ebbing and flowing which was observed on certain parts of the coasts of Great Britain.

The following Gentlemen were duly elected Ordinary Fellows:

Archibald Swinton, Esq., Professor of Civil Law in the University of Edinburgh.
Dr Begbie, Fel. Roy. Col. Surg. Edin.

The following Donations of Books to the Society's Library were announced:—

The London University Calendar for 1844.

The Examination Papers of the London University for the year 1844.—*By the Council of the University.*

The Transactions of the Linnæan Society of London. Vol. xix. Part 2.

Proceedings of the Linnæan Society of London. Nos. 15, 16, 17, 18.—*By the Society.*

Astronomical Observations made at the Radcliffe Observatory, Oxford, in 1840 and 1841. 2 vols. By Manuel J. Johnson, —*By the Radcliffe Trustees.*

Maps of the Irish Ordnance Survey, containing the county of Dublin, in 30 sheets.—*By the Lord Lieutenant.*

Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscow. Tome vii.—*By the Society.*

Monday, 4th March 1844.

Sir T. M. BRISBANE, President, Bart., in the Chair.

The following communication was read :—

On the Human Races in Britain, enumerated by Tacitus. By Dr Hibbert Ware.

This memoir had been undertaken as preliminary to an ethnological inquiry which the author had proposed to institute into the aborigines of the British Islands. It was premised, that, in this endeavour to seek for ancient races in those which were modern, great caution is required.

It has been asked, if, at the present day, we can as readily distinguish an Iberian type from one that is Gaulish or Caledonian, as was done more than seventeen hundred years ago in the time of Tacitus? It is answered, that, by a conservative principle in our nature, directed to the persistency of types, the influences of Time, Climate, and Civilization, are rendered of little avail. And, even in a mixture or crossing of races, there is an interposition of preserving laws made in favour of mutually approximating types, such as those of Europe. For instance, when two or more races are mingled together in different proportions, it is expected that the type of the minority will eventually become merged in that of the majority. But whether, in accelerating or postponing such a result, it will be found that, among all animals, nature exercises a sort of discretionary power under three varied circumstances: 1*st*, When races widely differ from each other; 2*d*, When races are in a less degree remote; and, 3*d*, When races, like those of Britain, or Europe in general, approximate closely to each other. These three circumstances the author discussed in succession.

1*st*, When races widely differ from each other, as in the crossing of the horse and the ass. In this case, nature has ever declared, that a debased or intermediate breed shall not be perpetuated.

2*d*, When races are in a less degree remote. In this example nature acts with uniformity, as in the crossing of the spaniel with the greyhound, &c.; and, among the human species, in the mixture of European and black races. In any one of these instances, there is no incapacity in the progeny to perpetuate its breed; but it will be found that the principle directed to the persistence of races gradually restores, in the course of a few generations, the purity of any one of the types which may have been contaminated by mixture, while the other type, in the meantime, is doomed to extinction.

3*d*, When races approximate closely to each other, as when spaniels (of which there are divers breeds), are crossed among themselves, and the same of white and grey mice, the result shews that, in the progeny, the types of a paternal or maternal stock are less liable to occur in an intermediate, than in a perfectly distinct form; or, in other words, that there is a less tendency to a fusion than to a separation of types. For instance, in the Western Highlands of Scotland, which were peopled in succession by the dark-haired Gael, and the flaxen-haired Scandinavian, there is, in the descendants, less a mixture than a separation of the types; the progeny of many families of the peasantry illustrating the distinctness with which Gaelic and Scandinavian characters are reproduced in cases where the paternal and maternal types differ from each other.

In bringing forward these illustrations, it was far from being argued that a progeny did not often exhibit an intermediate character, derived from the two races of a paternal and maternal stock; it was simply urged that a separation of types is equally, if not more common; and that, when a sort of intermediate character is actually derived from two European races, it is not necessarily perpetuated to a future progeny. On the contrary, a pure and distinct type, even though rendered, for a generation or two, intermediate and obscure, is often revived, with all its primitive decision of character.

The author, lastly, availed himself of the occasion to state, that the laws which appertained to the characters of races, hold good also with *individual* distinctions; and that nature seemed far more intent upon perpetuating through successive generations, what might be named the type of the *individual*, or *person*, than upon producing intermediate likenesses, referred (often fancifully) to two types, paternal and maternal.

From all these observations, it was concluded, that, although in every society of mixed races the type of the minority had a tendency to become merged, or to disappear in that of the majority, yet that, by the interposition of relaxed laws, made in favour of the mixture of two or more approximating races, such a result (in the absence of exterminating wars, famine, or pestilence) may be postponed to an incalculable period of time; and, as an ultimate consequence, that the discovery of ancient European races in those which are modern is a reasonable expectation not likely to be frustrated.

After these observations, the author proceeded to the chief object of the Memoir, which was to explain, on ethnological principles, the ancient British races enumerated by Tacitus. These were, 1*st*, the Caledonians—" the red hair of those who inhabit Caledonia, and their large limbs, bespeak a German origin;" 2*d*, the Gauls—" those who are nearest to the Gauls are also similar to them;" and, 3*d*, the Iberians, indicated by their swarthy features and their curled hair.

The following exhibits a classification of the modern British races with which the author compared those enumerated by Tacitus; but the description of them does not admit of abridgment.

(A.) RACES REFERRIBLE TO THE LIGHT-HAIRED GERMAN STOCK.

Under the common title *German*, it was supposed that three races, and possibly a fourth, might be included.

(*a*) *The Teutonic race.*—To this race the description given of the Germans by Tacitus was supposed to apply exclusively. This type the author stated to be found in Scotland and the north of England.

(*b*) *The Scandinavian race.*—This type was described by the author as it occurs in Orkney and Shetland, in the North and West Highlands of Scotland, and in Ireland.

(*c*) *The Anglo-Frisian race.*—The type prevails in the south and midland districts of England, but diminishes in the northern counties and in Scotland.

(*d.*) *The Pictish race.*—The author has not yet had leisure to verify his suspicion, that there exists, in certain Scottish districts, another German race, to which, possibly, the description given of the Picts by Adamnan and various early writers, may apply.

(B.) THE DARK-HAIRED RACES OF EUROPE.

Between the light-haired and dark-haired races of Europe constitutional differences exist; the former shewing the sanguine, and the latter the melancholic temperament. In the female constitution the diversity is still more apparent. Under the dark-haired races are included (*a*) the Cymric; (*b*) the Gaulish; (*c*) the Iberian. Tacitus merely distinguishes the two latter; but under the term Galli of the ancients, two distinct races are included; and when the Romans alluded to the gigantic stature of the Gauls, the description could only apply to the Cymric race, variously named Cimmerii, Cimbri, and Ombri, who were contemporary with the Gauls.

(*a*) *The Cymric race.*—This was the type of the ancient Britons in the time of Tacitus, as well as of the Belgæ and Armorici in Gaul. It was also that of the Fir-bolgs (Viri Bolgæ) of Ireland.

(*b*) *The Gaulish or Gallic race;* also named Celtic,—a name which M. Thierry has proved to be merely a local one applied to an armed confederation of Gauls. The type was that of a third part of Gaul; and, in the time of Tacitus, it distinguished the population of Ireland, part of Wales, and perhaps a few limited districts of Caledonia.

(*c*) *The Iberian race.*—This type is still to be studied in the ancient Silurian district of Tacitus, particularly in the counties of Monmouth and Brecon. Hitherto the characters of this race have not been defined; which blank in ethnology it was one of the leading objects of the present memoir to supply;—while another, yet an ultimate one, was to shew, that the Iberian tribes are to be considered as the aborigines of the British Islands, as well as of Spain, Ireland, Gaul, and Italy.

The following Donations of Books to the Society's Library were announced:—

Annuaire Magnétique et Météorologique du Corps des Ingénieurs des Mines de Russie, Par A. T. Kupffner. Année 1841.—*Par le Ministre des Finances.*

Journal of Agriculture, and Transactions of the Highland and Agricultural Society of Scotland, March 1844.—*By the Society.*

Observations on Days of unusual Magnetic Disturbance made at the

British Colonial Observatories, under the Departments of the Ordnance and Admiralty. Printed by the British Government, under the superintendence of Lieutenant-Colonel Sabine, of the Royal Artillery. Part 1. 1840–1841.—*By the Master-General of the Ordnance.*

Monday, 18*th March* 1844.

Dr ABERCROMBIE, V.P., in the Chair.

The following communications were read :—

1. On the Existence of an Osseous Structure in the Vertebral Column of Cartilaginous Fishes. By James Stark, M.D., F.R.S.E.

The author, after quoting from the works of writers on Ichthyology and Comparative Anatomy their descriptions of the vertebral columns of cartilaginous fishes, proceeded to point out the existence of an osseous structure in the vertebræ of the Plagiastomi, or Rays and Sharks. In these animals the essential portion of each vertebra consists of a double cup or saucer-shaped osseous piece, resembling in form and structure the double cup-shaped vertebræ of osseous fishes, being, like them, composed of concentric rings of osseous matter. It was shewn that the whole of the encrusting cartilaginous matter, with its calcareous granules, could be removed from this osseous structure, without affecting the integrity of the spinal column, or interfering with the intervertebral ligamentary apparatus which was alone attached to this osseous structure. These double cup or saucer-shaped vertebræ were in the Rays shewn to be perforated by an extremely minute central aperture, which was, however, of a considerably larger size in a few genera of Sharks, as in the Dog-fish; while in others, as in the Saw-fish, no such aperture could be distinguished.

These double cup or saucer-shaped vertebræ receive various strengthening columns, pillars, or plates of osseous matter, which differ in structure and disposition in the several genera and species of cartilaginous fishes. In some, these plates were shewn to have a concentric arrangement, and to be separated from each other by plates of cartilage. In others, the plates were broad and flat, and extended only from the margin of the one cup to that of the other cup of the same vertebra. In others, the supports were compound and broad and had a somewhat radiated arrangement from the centre to the circumference. While in others, two of these modes were united in strengthening the osseous cups.

The peculiarities of these double osseous cups, and their supporting columns, were pointed out in the vertebræ of the Common Skate (Raia batis), Thornback Ray (R. clavata), Sharp-nosed Ray (R. oxyrhynchus), Starry Ray (R. radiata), Common Dog-fish (Scyllium Catulus), Spotted Dog-fish (S. canicula), Picked Dog-fish (Spinax acanthias), Common Tope (Galeus vulgaris), Basking Shark (Selache maximus), White Shark (Carcharias vulgaris), Saw-fish (Pristis antiquorum), and Chimæra (Chimæra monstrosa).

The vertebral column of the Sturiones and Cyclostomi was shewn to be essentially composed of soft transparent cartilage.

It was demonstrated by a chemical analysis of the essential osseous portions of the vertebræ, that they were true bone. This was evidenced by their containing the same amount of earthy and animal matters, as the bones of osseous fishes, as well as by their earthy salts being of the same nature in both classes of bones. The result of the author's analysis gives, as a mean, about 69 per cent. of earthy matters, chiefly consisting of phosphate of lime, and 31 per cent. of cartilage. The chemical composition of the common cartilaginous skeleton, and of the vertebræ, with their encrusting cartilage and calcareous granules, was also noticed, in order to shew the essential difference between them and the truly osseous portion of the vertebræ.

From these peculiarities in the spinal column of the Plagiostomi (Rays and Sharks), taken in connection with the higher degree of development of their nervous, generative, and digestive systems, the author concluded, that these fishes ought to form a new subclass, and, in the descending scale of organization, be placed at the head of the fishes, as they manifestly form the connecting link between the osseous fishes and the reptiles. He also concluded, that the Sturiones and Cyclostomi ought to be arranged together as a distinct subclass, to which the term of *cartilaginous* might still be retained, and be placed after the osseous fishes, in the descending scale of natural classification; as the lower grade of development of their whole systems, taken along with their essentially cartilaginous skeletons, constituted them the connecting link between the higher mollusca and the more imperfectly organized osseous fishes.

The paper was concluded by pointing out the probable importance to the geologist of the discovery of an osseous structure in the vertebral columns of the Plagiostomi, and one or two instances were referred to in illustration of this part of the subject.

2. Farther Observations on Glaciers, by Professor Forbes.

Previous to the reading of the papers, the President announced that the Keith Prize had been awarded by the Council to Professor Forbes for his Papers on Glaciers.

The following Gentlemen were duly elected Ordinary Fellows of the Society :—

Nicholas Grut, Esq.
Rev. Archibald Bennie, one of the Ministers of the City.
David Stevenson, Esq., Civil Engineer.
Dr J. Y. Simpson, Professor of Midwifery, Edin. Univ.

The following Donations of Books to the Society's Library were announced :—

Journal of the Royal Geographical Society of London. Vol. xiii. Part 1.—*By the Society.*

The American Journal of Science and Arts, conducted by Professor Silliman and Benjamin Silliman, Jun. January 1844.—*By the Editors.*

Scheikundige Onderzoekingen, Gedaan in het Laboratorium der Utrechtsche Hoogeschool. 2d Deel. 2d Stuk.—*By the Editors.*

Flora Batava. No. 131.—*By the King of Holland.*

Maps of the Ordnance Survey of England and Wales. Sheets Nos. 88 and 89. *By the Master-General of the Ordnance.*

Kongl. Vetenskaps—Academiens Handlingar för Ar 1841.

Arsberättelse om Framstegen i Kemi och Mineralogi, af Jac. Berzelius, för 1841, 1842, och 1843.

Arsberättelse om Technologiens Framsteg Ar 1841, af G. E. Patsch.

Arsberättelse om Zoologiens Framsteg under Aren 1840, 1842, af C. H. Boheman.

Berättelse om Astronomiens Framsteg för Aren 1837, 1841, af N. H. Selander.—*By the Royal Academy of Sweden.*

Monday, 1*st* *April* 1844.

Sir T. M. BRISBANE, President, Bart., in the Chair.

The following communications were read :—

1. On the Development, Structure, and Economy of the Acephalocysts of Authors ; with an Account of the Natural Analogies of the Entozoa in general. By Harry D. S. Goodsir, Conservator of the Museum of the Royal Coll. Surg. Edin. Communicated by John Goodsir, Esq.

The Acephalocyst or Hydatid is composed of a vesicle containing fluid. It propagates by means of internal gemmules, which are developed between the layers of the membrane composing the vesicle, and, after a certain time, are thrown off internally.

The author, after pointing out these distinguishing characters of the Hydatid, referred to the confusion which had arisen, from want of proper observations on this point, and which, with other causes, had been the reason why the animal nature of these creatures had been denied by some writers of great authority.

The author having procured a new form of Acephalocyst, was enabled, from his observations on its structure and economy, to determine several important points relative to the anatomy, physiology, and natural history of the other species of the class.

He characterised this new species of Acephalocyst as a compound animal, inasmuch as one continuous membrane covered a complete group or mass of the Hydatids. This membrane was described as consisting almost entirely of tubuli, ramifying freely through it, and a number of ovoid disks scattered at short intervals over its surface, the edges of which were lined with minute open stomata, which opened into the tubuli. The author looked upon these tubuli and stomata as the organs of nutrition.

Another membrane lay immediately beneath that already described, and covered each Hydatid in particular. The body of the Hydatid itself consisted entirely of a homogeneous mass of gelatine, intersected by a number of very delicate septa.

The author now described the mode of propagation, which he stated was analogous to that of the polyps, in so far, that, 1*st*, there was a number of ova thrown off for the extension of the parent group ; and, 2*d*, another generation for the extension of the species generally. These ovules arose from the internal surface of the external tubular membrane, and consisted of a parent cell, containing young ones within it.

The author here directed attention particularly to the mode of growth in this and the simple Acephalocyst, as compared with that of the next known animal in the class, viz., the Cænurus. He stated, that, in the first (Hydatid), one cell was thrown off from the internal surface of the vesicle, which increased in size by simple dilatation, without any cellular development whatever. The growth of the new form of Acephalocyst was exactly similar,—with this difference, that originally there was a parent cell which formed a number of young cells within it, each of which afterwards became the separate individual, by simple dilatation also.

The author, after describing the adult Cænurus, then proceeded to state the observations he had made on its development from the ovule upwards. He stated, that the ovule, when observed within the body of the parent animal, was composed, first, of a germinal spot within a germinal vesicle, and which was enclosed in a yolk of very considerable size. The yolk, again, was surrounded by a very thin layer of albumen, defended by the shell or external covering.* After the ovum escaped from the parent, the germinal spot increased very much in size, and a small clear spot appeared in its centre.

During the third stage, the germinal spot had increased considerably in size, and had become nodulated; the central spot had also increased in size.

During the fourth stage, the nodules had become separate cells, surrounding a central cell, which had also a germinal spot within it. This again underwent similar changes, and was succeeded in turn by other crops of cells in like succession. This formation of cells, from a succession of centres, only extended the growth in a lateral direction, the author therefore named this the discoidal *period* of growth, which again he subdivided into minor *stages*.

After describing all the stages of discoidal development, he proceeded to point out a change that took place in the mode of development of the cells, and which, according to the direction of growth, he named the vertical *period* of growth.

During the discoidal *period* of development, all the cells were produced from one series or succession of centres; but during the vertical *period*, instead of one, there were several, each of which form young cells. The excentric cells of this *period* were all productive, and so, able to form new centres. The number of centres, however, were always limited, owing to the liquefaction and absorption of numerous peripheral cells.

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* The author looks upon these parts of the ovule as merely analogous to those of the higher animals.

The author, in the concluding part of his paper, stated, that during his observations, he was led to perceive the existence of many beautiful analogies between the Entozoa and the species belonging to other classes of the animal kingdom.

The volvox among the infusoria, he considered as the analogue of the Hydatid, and illustrated this by examining their economy comparatively.

The Alcyonidium among the Polyps, is the analogue of the new form of Acephalocyst. Ova in both cases being developed, 1*st*, for the purpose of increasing the bulk of the parent group; and, 2*d*, for the purpose of being distributed generally, to form separate and independent groups. In the function of nutrition the analogy also held true, inasmuch as each of the stomata or disks, it may be, supplied nourishment to the whole group, as well as to its own particular part; in the Alcyonidium, each polype acts as a mouth for the group.

Proceeding upwards in the scale, the author looks upon Diplozoon as the analogue of the Asterias, Tristoma, as that of Scutella and Distoma, that of Echinus; and brought forward an interesting observation, which he thought decisive as to the propriety of the analogies drawn between these Entozoa and Echinodermata, namely, that as the Echinus is merely an Asterias, with the rays folded back, so as to meet at the tips and form a globe, so is the Distoma merely a Diplozoon, with the two bodies folded together.

The Acanthocephala, of which the Echinorynchi are the types, are analogues of the Crustacea, through the Lerneæ. The Cœlelmintha, of which the Lumbricoides are the types, are analogous to the Annelida through the Lumbrici.

2. Account of a Repetition of Dr Samuel Brown's Processes for the Conversion of Carbon into Silicon. By George Wilson, M.D., Lecturer on Chemistry; and John Crombie Brown, Esq. Communicated by the Secretary.

The authors commenced with an account of the trials they made with the Cyanide of lead; which, according to Dr Brown's most recent announcement, is resolved by his process into gaseous nitrogen and silicon. In the first place, however, they could not succeed in obtaining a pure cyanide of that metal. For whether they decomposed the cyanide of potassium, or the hydrocyanate of ammonia containing an excess of hydrocyanic acid, by neutral acetate of lead, by this salt acidulated with acetic acid, or by tribasic acetate, they constantly obtained a compound containing a large quantity of a hydrated basic acetate of lead; and they were not more successful when they substituted other salts of lead for the acetate as a precipitant, such as the nitrate, basic nitrate, nitrite, chloride, or iodide. It was impossible, therefore, to obtain atomic results with the cyanide of lead. But several of the precipitates, obtained in the ways now mentioned, were subjected nevertheless to Dr Brown's process, and there was obtained a brown substance, which they expected to prove to be silicon. When fused, however, with carbonate of potash, instead of yielding more than twice its weight of silica, it gave only a tenth of its weight of a yellowish-white substance, which was not examined with any particular care, but which seemed to correspond with silica in its leading properties.

The Cyanides of copper and zinc were also rejected after adequate trials; and recourse was then had to the Cyanide of silver, which, it is well known, may be readily obtained pure and definite in composition. When similarly treated as in the process with cyanide of lead, it was converted by heat into a brown powder, with the loss of only a 400th of its weight; and when this was fused with carbonate of potash, there was obtained from the product a notable quantity of a substance corresponding in properties with silica, but still much inferior in quantity to what ought to have been obtained, had the whole carbon of the cyanide become silicon.

The authors next mentioned the results they obtained with the Ferrocyanides. The Ferrocyanide of potassium, when heated with carbonate of potash at a white heat, according to Dr Brown's earlier process, yielded them a saline mass, in which, in many trials, they could obtain only traces of a substance corresponding with silica in properties. Ferrocyanide of lead also yielded traces; Prussian blue none; Ferrocyanide of copper rather more than the similar salt of lead.

They then turned to Paracyanogen, which they treated repeatedly by Dr Brown's method of fusion with carbonate of potash. They were foiled, however, in obtaining his results. Paracyanogen obtained from cyanide of mercury, and purified by boiling it first with water, and then with solution of carbonate of potash, gave off, not nitrogen only, as Dr Brown has stated, but also carbonic acid and carbonic oxide; and the residue contained carbon. The authors, however, obtained some silica in the greater number of cases; occasionally none, even from paracyanogen prepared by Dr Brown himself; frequently very little; and never nearly the quantity which ought to have been obtained had the whole carbon become silicon, but fifteen per cent. at the utmost.

They also varied the process with Paracyanogen, by heating it alone for three days over an argand gas-flame in a malleable-iron crucible, luted and coated with stucco. A nut-brown powder, weighing 4.2 grains, was thus obtained from 18.5 grains of Paracyanogen. When 3.9 grains of this were fused with carbonate of potash, and the product treated as if it contained silicate of potash, the authors obtained 8.4 grains of a substance undistinguishable by any characters from silica. Had the brown powder been silicon, the product in this form should have been 8.11 grains. This experiment was twice repeated unsuccessfully.

The authors believe the substance obtained on this and other occasions to have been silica on the following grounds. It was a white, gritty powder, unalterable by ebullition in aqua regia for hours, or by exposure to a white heat, or to the full blow-pipe blast; fusible into a glass bead with carbonate of soda before the blowpipe; soluble with effervescence in fused alkaline carbonates, and recoverable from the product without any change of property; convertible, when heated with potassium, into a substance undistinguishable from silicon; and yielding fluo-silicic acid when heated with fluor-spar and sulphuric acid.

In conclusion, they deny that it is possible to ascribe the appearance of the silicon and silica in these experiments either to impurity of the re-agents employed, or to action upon the vessels constituting the apparatus. They consider, therefore, that silicon was produced in an anomalous manner; but they do not admit that it is proved to have come from the carbon; for it might have been derived as well from the nitrogen, or from both elements together. And they state, that they abandoned the farther trial of Dr Brown's processes, because they became satisfied, that his experiments cannot be repeated at will; and that the conditions essential to success have not been ascertained, nor the details of the processes sufficiently worked out, to afford the means of establishing the transmutability of carbon into silicon on quantitative grounds.

3. On Dr Mathew Stewart's General Theorems. By T. S. Davies, Esq, F.R.S.E.

The following Donations were presented to the Society since the last Meeting:—

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. i., Nos. 30, 31, 32, and 33.—*By the Academy.*

Proceedings of the Royal Irish Academy for the years 1841-42, and 1842-43.—*By the Academy.*

Sketch of the Civil Engineering of North America. By David Stevenson, Civil Engineer.—*By the Author.*

A Treatise on the Application of Marine Surveying and Hydrometry to the Practice of Civil Engineering, By David Stevenson, Civil Engineer.—*By the Author.*

Monday, 15*th April* 1844.

Very Rev. Principal LEE, V.P., in the Chair.

The following communication was read:—

1. Inquiry into the Aborigines of the British Islands. Part 2. On the claims of the Cymric and Gaelic races to be thus considered. By Dr S. Hibbert Ware.

In the first part of the present memoir, it was shewn that Cæsar divided Gaul into three parts, of which one was inhabited by the Belgæ, another by those who, in their own language, were called Celtæ, but who, by the Romans, were named Gauls, and a third by the Aquitani. These three nations, according to the Roman historian, differed from each other in language, custom, and laws; but it was remarked by the author, that they also differed from each other in physical characters,—the Belgæ possessing what is named a Cymric type, the Gauls proper a Gaulish type, and the Aquitani an Iberian type. All these three races were to be distinguished from the zanthous, light-haired, Germanic tribes of the West of Europe, not only by the dark colour of the hair and eyes, but by other particulars, as the form of the head, &c.

The present memoir was confined to (1*st*), the Cymric race, and (2*dly*), the Gaelic race.

(1*st*), *The Cymric race.*—The physiological distinction of Cymri and Gaelic races was first established by the late Dr W. F. Edwards, in his memoir " Des Caractères Physiologiques des Races d'Humain." The Cymric head is long, and often failing in width. The forehead is large and high ; the nose curved, with the extremity depressed, and the nasal ailes raised or turned up ; the chin strongly marked and prominent, and the stature tall. It was also explained by the author that these physical characters were associated with a distinct moral type.

It was argued, in the present memoir, that the Cymri had no real pretensions whatever to consider themselves (as in the ancient British triads) a primitive race in Britain. In tracing their progress from their oriental sojourning place to the remote west, they appear to have taken possession of no ground in any part of Europe which had not been preoccupied by other races. The author, in the course of arriving at this conclusion, gave the following historical account of the Cymri.

Sogdiana and Bactriana appear to have been the cradle of this race. At the present day, the Cymric type may be identified among the wandering tribes of Beloochistan, of which the author had evidence in some very accurate drawings, executed for him by his late son, during the expedition of Lord Kean.

The course of Cymric migration from east to west, was inferred by the occasional light which history affords of the physical characters of this early race, aided also by philological tests. The Cymric type is to be detected among some of the tribes anciently dwelling between the Caspian and Euxine seas, and in certain Egyptian sculptures, as figured by Rosallini, of the *Feccaro* (named by Wilkinson, *Tokkari*) dwelling, in the time of Rameses the Third, not far from the eastern shores of the Mediterranean. Various kinds of evidence also demonstrate, that the Cymri are to be traced, during their westerly migration, in Persia, along the shores of the Black Sea, in Greece, in Italy, and in the tracts watered by the Danube and the Rhine. They again appear as confederated tribes, known by the appellation of Boii, and Belgæ. Under the name of Firbolgs (Viri Bolgæ), they peopled Ireland, and, in occupying England and Scotland, they were lastly driven, by Saxon inroads, to the mountainous recesses of Wales. Various details of the greater or less prevalence of the Cymric type, as it is to be traced in these different countries, were supplied by the author.

(*2dly*), *The Gaulish, or Gaelic race.*—According to Dr Edwards, the head is round, so as to approach in a manner to a spherical form ; the forehead is moderate, a little swelled out, and retreating towards the temples; the eyes are large and open; the nose, in tracing it from the depression at its origin, is nearly straight, or without any marked curvature, and rounded at the extremity; the chin is also rounded. Lastly, the height is moderate; which, as Thierry, in his Histoire des Gaulois, first shewed, is an important historical distinction: for whenever the Romans spoke of the gigantic height of the Gauls, they meant their Cymric, and not their Gaelic foes. It was also explained that the moral type of the Gauls differed much from that of the Cymric race.

In considering the claims of the Gaelic race to be ranked as aboriginal in Britain, the author entered upon two questions, (*a*) their original sojourning place, and (*b*) their course of migration.

(*a*) The *Asiatic* cradle of the Gaelic race.—The author, after noticing the suspicion of Baron Larrey, that Arabia was to be thus considered, as well as the various opinions on this subject, advanced by Vallancey, Dr O'Conor, Sir William Betham, and others, was inclined to believe that the primitive Gauls were a polished and civilized people, originally dwelling on the eastern coast of the Mediterranean, who, as maritime adventurers, visited the west of Europe on objects of traffic, particularly for the sake of the precious metals. He did not consider it as necessary to this opinion, that they should be identified with the Phœnicians, or any other nation equally maritime; but left this question to be determined by more satisfactory evidence than has hitherto been adduced, resulting from a comparison of physical characters. It was also observed, that the leading physical characters of the Gael, namely, the form of the head and features, appear in the figures of certain sculptured monuments of the very early period of Rameses the Third, which, from a discordancy in other respects, have greatly puzzled both Champollion, and Rosallini. These figures of a civilized people, richly attired, are referred to inhabitants of Canaan or its confines.

(*b*) The course of Gaelic migration to the West.—The author was disposed to consider, that evidence of the westerly course of Gaelic migration might probably be found in the commercial settlements which early maritime tribes may have formed on the Mediterranean coasts and islands. He, accordingly, adverted to the remark of Baron Larrey, relative to the identity of the western Arabs with Gaulish races,—to the assertion of Gesenius, that the Numidian language was a pure, or very nearly pure, Hebrew, such as was spoken by the ancient Canaanites or Phœnicians,—and to various Cyclopean structures in Malta, on the African coast, and elsewhere, similar to those which characterise the westerly countries of the Gael. But the author dwelt most upon the account of the Turditani of Spain, as given by Pliny, to whom an early introduction of letters was ascribed, together with the use of valuable works of art wrought in the precious metals, resembling such as are constantly discovered in Ireland, which indicate the very early state of civilization in this country. The author then entered into a detailed description, from personal observation, of the greater or less frequency of the Gaelic type in France, Ireland, Scotland, and Wales; and of the causes to which its disappearance in many extensive districts might have been attributable.

After these explanations, the general question was considered,—What race ought to be regarded as aboriginal in the British islands? Llwyd had long since shewn, from the language of topography, that the Gauls had preceded the Cymri in the occupation of Britain. But it was asked,—if there might not have been a still earlier race existing in this country than the maritime and commercial Gauls?

To this question an answer was given in the affirmative. Tacitus, in his enumeration of British races, has suggested, that an ancient Iberian stock, remarkable for a swarthy complexion and curled hair, might have passed over and occupied the seat of the Silures (in South Wales);—a British tribe, with whom he was disposed to identify this primitive race of Spain.

It was then stated, that the author had collected abundant evidence which leads to the conclusion, that an Iberian, or Aquitanian race, was an older one in Britain than either of the two whose pretensions he had discussed; but that it would be in vain to establish their aboriginal claims, unless the history of the Cymri and the Gael, in reference not only to their Asiatic sojourning place, but also to their westerly course of migration, was well understood. He, lastly, expressed his hope, that, if the aboriginal claims of the Iberian race meet with confirmation, some light would be thrown upon the fossil bones of the human species which are found in caves, or buried deep in strata of peat, occasionally associated with the remains of animals now extinct, which have had an existence prior even to the records of history.

2. On the Knowledge of Distance given by Binocular Visions. By Sir David Brewster, K.H.

The following Gentleman was duly elected an Ordinary Fellow of the Society :—

Dr Thomas R. Colledge, Fel. Roy. Coll. Phys. Edin.

The following Donations of Books to the Society's Library were announced,

The Electrical Magazine. Conducted by Mr Charles V. Walker. Vol I., No. 2.—*By the Editor.*

Literarische Sympathien oder industrielle Buchmacherei : Ein Beitrag zur Geschichte der neueren Englischen Lexicographie, von Dr J. G. Flugel.—*By the Author.*

Fifty-Fifth Annual Report of the Regents of the University of the State of New York.—*By Dr Christison.*

Journal of the Asiatic Society of Bengal. Nos. 136, 137, 138, and 139.—*By the Society.*

Travels through the Alps of Savoy, and the other parts of the Parisime Chain, with observations on the phenomena of Glaciers. By James D. Forbes, F.R.S.S.L. and E., &c. &c.—*By the Author.*

Monday 6th May 1844.

Dr ABERCROMBY, V.P., in the Chair.

The following communications were read :—

1. On the Conversion of Relief by Inverted Vision. By Sir David Brewster, K.H.

2. On the Geology of Cockburn-Law and its Neighbourhood. By William Stevenson, Dunse. Communicated by David Milne, Esq.

The author, in the first part of his paper, described the nature of the formations, and in the last part offered his views in explanation of the appearances.

In describing the formations, he enumerated, first, those of *aqueous*, and last those of *ligneous* origin.

I. The former consist of the greywacke, the old red sandstone, and the coal-measure formations.

(1.) The *greywacke* strata form the summit of Cockburn-Law, having a strike about NE. and SW. nearly vertical. There appears to be no decided evidence of any organic remains in these strata ;—there are curious markings which are most probably only concretionary. At Hoardwheel, situated to the eastward of Cockburn-Law, two varieties of copper ore are found in the greywacke, the green and the grey, the former of which is the most plentiful, and imparts a beautiful hue to the rocks. The oxide of manganese is also widely diffused.

(2.) The *old red sandstone* strata lie over the upturned edges of the greywacke, and have therefore been deposited at a more recent epoch. At a distance from the hills they are generally horizontal, or dip away at a gentle angle ;—but at the sides of the hills they are highly inclined,—a circumstance probably caused by an upheaval of the hills, which took place after the date of this formation. These old red sandstones are extensively developed in Preston Haugh. The lowest bed consists of pebbles or fragments of rocks, both angular and rounded, derived from the wearing down of the greywacke and porphyritic rocks. The colour of this formation is, especially towards its base, of a red colour.

It is in this formation, that the bones, teeth, scales, and spines of the *Holoptichius nobilissimus*, a large ganoid fish, described by Agassiz, were found by the author in 1840. These are remains of the same kind of fish which have been found in Perthshire, England, Russia, and in other parts of the globe, and which abounded at the epoch of the old red sandstone formation ; for wherever it is found, these particular rocks prevail. The nature of the strata in which it is found—a coarse, gritty sandstone—seems to indicate that the *Holoptichius* swam about in waters near the shore ; another proof of which is afforded by the ripple marks on the sandstone slabs near their place of sepulture. These interesting relics are very abundant in the strata opposite to Cockburn Mill, and also about half a mile below it, on the right bank of the Whitadder.

(3.) The *coal-measure* strata lie above the old red sandstone rocks, but are not disconformable to them in dip. They are to be seen in the Whitadder, below Preston Bridge, and consist of the ordinary sandstones, shales, and strata of ironstone. The only fossils prevailing in them are those of terrestrial vegetables, which probably had been drifted by rivers.

II. The *Igneous* rocks were divided by the author into two classes —one of which he described as the Felspathic, the other as the Augitic.

(1.) The *Felspathic* rocks comprehend all those igneous rocks associated with the greywacke strata, consisting of the granites, and syenites, and old porphyries of Cockburn-Law, the Staneshiel, the Knock Hill, Blackerstone Hill, &c. The central parts of these igneous masses present the most crystalline appearance, consisting there of pyramidal and wedge-shaped blocks. In those parts approaching to and in contact with the greywacke strata, a rhomboidal parallelopiped structure prevails,—which also characterises the aqueous rocks when in contact with the igneous. It is interesting to notice the effect produced on the greywacke strata, by the outburst through and among them of these igneous rocks. Where the two kinds of rocks are immediately in contact, all signs of stratification in the greywacke have been obliterated; and, indeed, these strata appear to have been metamorphosed into syenite.

(2.) The *Augitic* trap-rocks exist almost entirely among the more recent aqueous rocks, viz. the old red sandstones and coal-measures. They are seldom or never seen within the range of the greywacke formation, at least in this neighbourhood.

These augitic traps exist both in the form of narrow dykes, and in that of great masses constituting hills. Of the former, the Cumledge trap-dyke is a good example. It is seen in the bed of Oxendean Burn at Cumledge House, and there forms in amygdaloidal greenstone, abounding in veins of zeolite, steatite, and other minerals. The width of the dyke at this place is about ten yards. The average direction of the dyke is NN.W. and SS.E. It has had the effect, as usual, of hardening the strata on each side of it. This dyke has been traced by the author for a considerable distance, running through both the old red sandstone and coal-measure formations. It appears also to reach into the granite of the Staneshiel and Cockburn-Law.

An overflow of amygdaloidal trap is to be seen on the left bank of the Whitadder, below Cockburn Mill, forming a bed of about four feet thick, and lying above the old red sandstone strata. There are large accumulations of greenstone at Borthwick and Castle Mains. Dunse-Law is also composed of basalt.

In the *second* part of his paper, the author shewed that the outburst of the granite and other felspathic rocks had taken place simultaneously with the upsetting of the greywacke formation, and before the deposition of the old red sandstones. He also stated, that when, after the deposition of the coal-measures, a new outburst of igneous rocks took place, the Lammermuir chain probably received an additional upheave,—as the considerable dip of the old red sandstone from that chain could not otherwise be very well accounted for. The colour of the old red sandstones he attributed to the wearing down of the greywacke and porphyritic rocks of a red colour. The reason why the outburst of the porphyritic rocks took place before the augitic traps, he supposed might be the smaller specific gravity of the former.

Mr Stevenson's paper was illustrated by a geological map, as well as by numerous sections.

3. Notice regarding The Indian Grass Oil, or Oil of Andropogon Calamus-aromaticus. By Thomas G. Tilley, Phil. D. Communicated by Dr Christison.

The oil known as Indian Grass Oil, has been referred by Dr Royle to the Andropogon Calamus-aromaticus, a plant which he conceives to be identical with the Καλαμος αρωματικος of the Greeks. It has been used in medicine as a stimulant embrocation in rheumatism, &c.

The oil, which was green, became yellow when heated. It acquired a steady boiling point at 440°, between which temperature and 442°, a transparent colourless oil distil over. This, after rectification by chloride of calcium, was analysed, and found to have the following composition.

	Found.	Atoms.	Calculated.
Carbon	88.10	10	88.46.
Hydrogen	11.29	16	11.54.

from which data, it appears that the oil of grass contains, and chiefly consists of a carbo-hydrogen, in which the proportion of the carbon is to the hydrogen, as 10 to 16, as in the case of oil of turpentine, and other volatile oils of the same class.

The following Donations of Books to the Society's Library were announced:—

Mémoires présentés par divers Savants à l'Académie Royale des Sciences de l'Institut de France. Tome viii.—*By the Royal Academy.*

Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. Tome x., Part 1.—*By the Society.*

Annales des Sciences Physiques et Naturelles d'Agriculture et d'Industrie de Lyon. Tome v.—*By the Royal Society of Agriculture at Lyons.*

Bulletin de la Société Géologique de France. (Deuxieme Serie.) Tome i. Feuilles 8-10.—*By the Society.*

Memoirs of the Literary and Philosophical Society of Manchester. Vol. vii., Part. 1.—*By the Society.*

Journal of the Statistical Society of London. Vol. vii., Part 1.—*By the Society.*

Scheikundige Onderzoekingen, gedaan in het Laboratorium der Utrechtsche Hoogeschool. Deel ii. Stuk 4.—*By the Editors.*

Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences. Tome xvii., Nos. 25 and 26; and Tom. xviii., Nos. 1-14.—*By the Academy.*